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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/578,301

05/04/2006

Naoki Suehiro

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7590

03/02/2009

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER

SINGH, HIRDEPAL

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

03/02/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<i>Office Action Summary</i>	Application No.	Applicant(s)	
	10/578,301	SUEHIRO, NAOKI	
	Examiner	Art Unit	
	HIRDEPAL SINGH	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 May 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,6-8,10 and 12 is/are rejected.
- 7) ☒ Claim(s) 2-5,9 and 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 May 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/4/06, 10/3/06</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is in response to the preliminary amendment filed on May 04, 2006.

Claims 1-12 are pending and have been considered below.

Drawings

2. Figure 16 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 1-6 and 12 are objected to because of the following informalities: claim 1 is an independent claim and an independent claim is supposed to have a preamble separated from the body of the claim by a colon (:) and the limitations are supposed to end by a semicolon (;). Also claim 1 is a method claim and a method claims is made up of steps but in this case claim 1 seems to have only one part/step after the semicolon. Appropriate correction is required.

4. Claims 7-11 are objected to because of the following informalities: claim 7

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recites a limitation in lines 4-5, "...orthogonal to the [common] row vector or column vector" it seems like a typo error, for the examination purposes it is treated as if there is no bracket i.e. "...orthogonal to the common row vector or column vector".

Appropriate correction is required.

5. Claim 9 recites a limitation in line 5, "0 data of a predetermined length..." it seems like a typo error and suggested to deleted "0" at beginning of line 5.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 1-5 and 7-11 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent¹ and recent Federal Circuit decisions² indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim recites a series of steps or acts to be performed, the claim neither transforms underlying subject matter nor is positively tied to another statutory category that accomplishes the claimed method steps, and therefore does not qualify as

¹ *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

² *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

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a statutory process. For example, claim 1 recites a method that forms signal for transmission, the recited signal array generation by multiplying coefficients of matrix to data and multipath signal, is purely a mental step, that for a person of ordinary skill in the art, can be done by hand (mental process) and does not require a processor or device.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Kim et al. (US 2002/0181554).

Regarding claim 1:

AAPA discloses a communication method for transmitting a multipath characteristic measurement signal and a plurality of data transmission signals (as shown in figure 16),

wherein the multipath characteristic measurement signal and data transmission signals (A_n and B_n C_n in figure 16) are a signal array formed by a plurality of coefficient matrices that are orthogonal to one another (background art; page 2, lines 17-19) within the matrices and which comprise at least one coefficient array that is common in the column direction or row direction (page 2, lines 18-29; page 4, lines 13-20 and figure 16

describes coefficients of matrix formed with multipath measurement signal A_n and plurality of data transmission signals).

AAPA discloses all of the subject matter as described above except for specifically teaching that the multipath characteristic measurement signal formed by the respective coefficient matrices is the same signal array formed by the one common coefficient array.

However, Kim in the same field of endeavor discloses a mobile communication system and method where the multipath signal information is gathered and a signal is generated corresponding to the transmission signal signature (abstract; paragraphs 0011 and 0013) and the multipath characteristic signal represents coefficients of the matrix that is used for transmitting the data and multipath signal (paragraphs 0012 and 0088).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Kim in AAPA for forming multipath characteristic measurement signal with same coefficient array that is common in order to get a desired performance from the system with the phase and amplitude information of the signal is estimated and the delay associated with the transmission signal is compensated with desired performance.

10. Claims 6 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Kim et al. (US 2002/0181554) as applied to claim 1 above, and further in view of Hottinen et al. (US 2005/0078761).

Regarding claim 6:

AAPA discloses all of the subject matter as described above except for specifically teaching that an arbitrary user arbitrarily has a matched filter that corresponds with a coefficient array that is used in the formation of a transmission data array and receives an arbitrary data transmission signal via the matched filter.

However, Hottinen in the same field of endeavor discloses a high rate transmission diversity communication system where an arbitrary user arbitrarily has a matched filter that corresponds with a coefficient array that is used in the formation of a transmission data array and receives an arbitrary data transmission signal via the matched filter (paragraph 0038).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Hottinen in AAPA to form a matrix from plural matrices in the transmission signal in order to improve symbol rate with the diversity in the system without limiting the performance and data rates.

Regarding claim 12:

AAPA discloses all of the subject matter as described above and further discloses a transmission signal data structure formed by the method of forming a transmission signal (column 2, lines 18-28).

11. Claims 7-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Kim et al. (US 2002/0181554) further in view of Hottinen et al. (US 2005/0078761).

Regarding claim 7:

AAPA discloses method of forming a transmission signal, comprising the steps of:

forming a matrix (as shown in figure 16) of an arbitrary length by selecting orthogonal square matrices (background art; page 2, lines 17-19), the common row vector or column vector and an arbitrary number of row vectors or column vectors that are orthogonal (A_n B_n and C_n in figure 16) to the common row vector or column vector;

forming a multipath characteristic measurement signal (page 2, lines 18-29) array by multiplying each of the coefficient arrays of the common row vector or column vector by a multipath characteristic measurement signal (page 4, lines 13-20 and figure 16 describes coefficients of matrix formed with multipath measurement signal A_n and plurality of data transmission signals);

forming a data transmission signal array (page 2, lines 23-25, the signal array is formed) by multiplying each of the coefficient arrays of the other row vector or column vector in the matrix by each of the plurality of data transmission signals; and

rendering the multipath characteristic measurement signal array and data transmission signal array a transmission signal (page 3, lines 1-9).

AAPA discloses all of the subject matter as described above except for specifically teaching that, (1) forming a matrix from plurality of matrices for the transmission signal; and (2) the matrix formed by orthogonal square matrices comprises a common row or column vector.

However, regarding item (1) above, Hottinen in the same field of endeavor discloses a high rate transmission diversity communication system where for the transmission signal (figure 1), a matrix is formed by plural matrices transformed from code matrices to get the transmission matrix (paragraphs 0016-0017 and 0035-0037).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Hottinen in AIPA to form a matrix from plural matrices in the transmission signal in order to improve symbol rate with the diversity in the system without limiting the performance and data rates.

However, regarding item (2) above, Kim in the same field of endeavor discloses a mobile communication system and method where the multipath signal information is gathered and a signal is generated corresponding to the transmission signal signature (abstract; paragraphs 0011 and 0013) and the multipath characteristic signal represents coefficients of the matrix that is used for transmitting the data and multipath signal (paragraphs 0012 and 0088).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Kim in AIPA for forming multipath characteristic measurement signal with same coefficient array that is common in order to get a desired performance from the system with the phase and amplitude information of the signal is estimated and the delay associated with the transmission signal is compensated with desired performance.

Regarding claim 8:

AAPA discloses all of the subject matter as described above except for specifically teaching that the orthogonal square matrix is a Hadamard matrix or a unitary matrix.

However, Hottinen in the same field of endeavor discloses a high rate transmission diversity communication system where orthogonal square matrix is a Hadamard matrix (paragraph 0025).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Hottinen in AAPA to form a matrix from plural matrices in the transmission signal in order to improve symbol rate with the diversity in the system without limiting the performance and data rates.

Regarding claim 10:

AAPA discloses all of the subject matter as described above and further discloses the number of row vectors or column vectors used in the formation of the data transmission signal array is established on the basis of the received multipath characteristic measurement signals (page 3, lines 1-9).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Toda et al. (US 2004/0145518) discloses a system and method for carrier phase based relative positioning device.

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- b. Suzuki et al. (US 6,967,990) discloses a system and method for interference cancellation in wireless communication.
- c. Crilly, Jr. (US 2002/0159537) discloses a multipath communication system and method.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HIRDEPAL SINGH whose telephone number is (571) 270-1688. The examiner can normally be reached on Mon-Fri (Alternate Friday Off) 8:30AM-6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/H. S./

Examiner, Art Unit 2611

/Shuwang Liu/

Supervisory Patent Examiner, Art Unit 2611